

REMARKS

The Office Action dated March 19, 2003 has been received and carefully noted. The above amendments and the following remarks are submitted as a full and complete response thereto. By this Amendment, claim 1 has been amended to correct a minor grammatical error. No new matter has been added or amendments made that narrow the scope of any elements of any claims. The claim changes are merely cosmetic in nature. Accordingly, claims 1-5 are pending in this application and are submitted for consideration (claims 6-9 being withdrawn from consideration).

Entry of this Amendment is proper under 37 C.F.R. § 1.116 since this Amendment: (a) places the application in condition for allowance for reasons discussed herein; (b) does not raise any new issue regarding further search and/or consideration since the Amendment amplifies issues previously discussed throughout prosecution; (c) does not present any additional claims without canceling a corresponding number of finally-rejected claims and (d) places the application in better form for appeal, should an appeal be necessary. The Amendment is necessary because it is made in reply to arguments raised in the rejection. Entry of the Amendment is thus respectfully requested.

35 U.S.C. § 112, Second Paragraph

Specifically, claim 1 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. By this Amendment, claim 1 has been further amended to more clearly particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Therefore, Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-5 under 35 U.S.C. § 112.

35 U.S.C. § 102(e)

Claims 1-5 were rejected under 35 U.S.C. § 102(e) as being anticipated by Suyama et al. (U.S. Patent No. 6,055,255, "Suyama"). In making this rejection, the Office Action asserted that Suyama discloses each and every element of the claimed invention. However, Applicant respectfully submits that claims 1-5 recite subject matter that is neither taught nor disclosed in Suyama.

Applicant's amended claim 1 recites a semiconductor laser. The laser includes an n-type clad layer and a p-type clad layer. An active layer is sandwiched by the n-type clad layer and the p-type clad layer. A current constriction layer for current confinement and light confinement consists of at least two layers which are disposed in either of the n-type clad layer and the p-type clad layer. A first layer of the current constriction layer closer to the active layer has a different conductivity type from a conductivity type of either of the clad layers in which the current constriction layer is provided and is made of a material having almost the same refractive index as the clad layer, the refractive index of the first layer being smaller than that of the active layer. A second layer of the current constriction layer further from the active layer is made of a material having a smaller refractive index than the first layer.

The first layer of the current constriction layer of the present invention is a layer that does not absorb the emitted light and scarcely has a light confinement effect and has a main function of current confinement. Consequently, the first layer is made of a material having almost the same refractive index as the clad layer and smaller than that of the active layer, as recited in amended claim 1. The second layer of the current constriction layer is a layer with a light confinement effect and is made of a material with

a refractive index smaller than that of the first layer, as further recited in Applicant's amended claim 1.

Suyama discloses a semiconductor laser that has an oversaturated absorption layer, saturable absorbing layer 9 (first current blocking layer). The semiconductor laser 100 disclosed in Suyama is formed by placing a clad layer 3 formed from $n\text{-Al}_{0.5}\text{Ga}_{0.5}\text{As}$ formed on a buffer layer 2. On top of the clad layer 3 is formed an active layer 4. This active layer 4 is formed from $\text{Al}_{0.14}\text{Ga}_{0.86}\text{As}$. A second clad layer 5 formed from $p\text{-Al}_{0.5}\text{Ga}_{0.5}\text{As}$ is formed on active layer 4. Etching stopping layers 6 and 8 are formed on clad layer 5. The first current blocking layer 9 is formed as a saturable absorbing layer from $n\text{-Al}_{0.14}\text{Ga}_{0.86}\text{As}$. A second current blocking layer 10 is formed from $n\text{-Al}_{0.6}\text{Ga}_{0.4}\text{As}$ on current blocking layer 9. The second current blocking layer 10 does not absorb light. A protection layer 11 is provided on the second current blocking layer 10. A third clad layer 12 is formed from $p\text{-Al}_{0.5}\text{Ga}_{0.5}\text{As}$ on protection layer 11. Clad layer 12 is followed by a cap layer 13 and an electrode layer 14.

The first current blocking layer 9 (first layer) is made of material with a refractive index nearly similar to that of the material of active layer and the second current blocking layer 10 (second layer) is made of material with a refractive index smaller than that of the active layer.

Consequently, Suyama forms the saturable absorbing layer 9 in the current blocking layer as the first layer in order to obtain a self-sustained pulsation type laser. In Suyama, it is necessary to use the oversaturated absorption layer (first current blocking layer 9) with a refractive index similar to that of the active layer so that oversaturated absorption effects can be exhibited in the current blocking layer. These

effects are recited in claims 3 and 5 of Suyama. In contrast, the present invention has a structure with no saturable absorbing layer provided, which basically differs from Suyama.

In other words, the present invention differs from that of in Suyama in that the first layer of the current constriction layer of the present invention is made of a material with a refractive index almost the same as that of the clad layer, whereas the first layer of Suyama is made of material with a refractive index almost the same as that of an active layer. It is well known in the art that the refractive index of the clad layer is smaller than a refractive index of an active layer in a semiconductor laser.

The Office Action asserted that because the refractive index of current blocking layer 9 of Suyama is 0.12 or more, it might be possible to be 0.5, but as described on col. 9, lines 54-59 of Suyama, the Al mode fraction is preferably equal to that of the active layer (0.14) and if not, it is set within the range between 0.12 and 0.16, which is far different from 0.5, the mole fraction of the clad layer. This is because it is an intention of Suyama to make the first current blocking layer a saturable absorbing layer and that is why Suyama cannot form the first current blocking layer with the composition the same as the clad layer.

In contrast, amended claim 1 recites that the first layer of the current constriction layer closer to the active layer has a different conductivity type from a conductivity type of either of the clad layers in which the current constriction layer is provided and is made of a material having almost the same refractive index as the clad layer, the refractive index of the first layer being smaller than that of the active layer. As

discussed above, Suyama teaches that the first current blocking layer 9 has a refractive index greater than the clad layer 5 or 12.

In addition, the Office Action asserted that if the Al mole fraction is set to 0.15, the refractive index is smaller than that of the active layer. However, the rejection is unclear because Suyama only indicates that the refractive index of the first layer is smaller than that of the active layer. However, in the present invention, not only is the first layer refractive index smaller than that of the active layer, it is also almost the same as that of the clad layer, as recited in amended claim 1.

In addition, Suyama fails to disclose or suggest the feature of claim 4 of the present invention in that the inclination angle of the striped trench of the first layer is smaller than the inclination angle of the striped trench of the second layer.

Therefore, Suyama fails to disclose or suggest the present invention. Specifically, Suyama fails to disclose or suggest a first layer of the current constriction layer closer to the active layer is made of a material having almost the same refractive index as the clad layer, the refractive index of the first layer being smaller than that of the active layer, as recited in amended claim 1. Suyama also fails to disclose or suggest that the inclined surface of the first layer has a smaller inclination angle than the second layer, as recited in claim 4.

Therefore, it is respectfully submitted that the Applicant's invention, as set forth in claim 1, is not anticipated within the meaning of 35 U.S.C. § 102.

Further, as claims 2-5 depend from claim 1, Applicant submits that these claims recite subject matter that is neither disclosed nor suggested by the prior art, for at least the reasons set forth with respect to claim 1.

Conclusion

In view of the foregoing, reconsideration of the application, withdrawal of the outstanding rejections, allowance of claims 1-5, and the prompt issuance of a Notice of Allowability are respectfully solicited.

If this application is not in condition for allowance, the Examiner is requested to contact the undersigned at the telephone listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this paper, may be charged to counsel's Deposit Account No. 01-2300, **referencing docket number 107400-00026.**

Respectfully submitted,

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